LIBRARY

NOVEMBER/DECEMBER 2023

GEPH24C/DEPH24C — NON–LINEAR OPTICS

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Write any two characteristics of a laser source.
2. Name two gas lasers
3. Define optical bistability.
4. What are anisotropic crystals?
5. List any two electro-optic effect.
6. What is meant by refractive index.
7. Name two inorganic nonlinear optical materials
8. Give some of the applications of nonlinear optical materials.
9. List factors that determine fiber bandwidth.
10. What are leaky modes?

1230

SECTION B — (5 × 5 = 25 marks)

Answer ALL the questions.

11. (a) Explain how population inversion is achieved in a He-Ne with the help of an energy level diagram.

Or

(b) Compare solid state lasers with gas lasers.

12. (a) Discuss difference frequency generation.

Or

(b) Write a short note on terahertz radiation.

13. (a) With the help of mathematical equations, describe stimulated Raman scattering.

Or

(b) Discuss three photon process in detail.

14. (a) Write a short note on organic non linear optical materials.

Or

(b) Explain why borates are good nonlinear optical materials.

15. (a) Write the differences between single mode fiber and multi mode fiber.

Or

(b) Derive an expression for numerical aperture of an optical fiber.

ARTS & SCIENCE COLLEGE LIBRARY

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the construction and working of any semiconductor laser with the help of diagrams.

17. Discuss the wave propagation in an anisotropic crystals.

18. Explain the theory of the two photon process. Describe an experiment to demonstrate the same.

19. Discuss the various mechanisms that determine laser induced surface damage threshold.

20. List the different losses in optical fiber.
